

# Keele Observatory Annual Report 2012



50 years



## Table of Contents

<b>From the Director .....</b>	<b>2</b>
<b>Administrative report .....</b>	<b>2</b>
Personnel.....	2
Finances .....	2
<b>Infrastructure and equipment .....</b>	<b>3</b>
Development of Observatory Hill .....	3
The Keele Observatory workshop .....	4
Engineering work on the Thornton .....	4
Maintenance of the Grubb and its dome .....	5
<i>The Solar Telescope Project</i> .....	6
<i>Crime and in-kind donations</i> .....	7
<b>Research activities.....</b>	<b>7</b>
Solar observations .....	7
Publications .....	8
<b>Outreach activities .....</b>	<b>8</b>
BBC2's "Stargazing Live" .....	8
Keele Observatory's Birthday Party .....	8
The last Venus Transit of our generation .....	9
Public viewings .....	9
Schools and teachers .....	10
Community group visits.....	10
Adult Education sessions.....	10

## From the Director

Keele Observatory reached a milestone this year by celebrating its 50<sup>th</sup> anniversary. This was done in the form of a “birthday party” with distinguished speakers, public interest and above all the presence of Ron Maddison, founder of the observatory. Ron recalls his memories of the first fifty years of the observatory in a booklet produced specially for the occasion.

The other major event was the 2<sup>nd</sup> edition of BBC’s Stargazing Live, which saw an unprecedented one thousand visitors pass through the observatory’s doorways, posing a real challenge but considered a great success by all concerned. The Venus transit campaign unfortunately met with an overcast sky.

The eternal public icon of British Astronomy, Patrick Moore died peacefully in his sleep, on Sunday 9 December. Thus ended an era. For decades Patrick Moore presented BBC’s “The Sky at Night”; one of its early editions featured the young Keele Observatory. Patrick is remembered also for having played his xylophone at the observatory’s refurbishment celebratory Star Party in the mid 1980s, and not least by the bronze bust welcoming the public upon entering the observatory.

The observatory remains a facility predominantly used for public outreach, and this is unlikely to change. It was hoped, though, that the 24” could be taken back into active research operation. While this did not happen in 2012, the project at last gained momentum in the final months and is now expected to be realised in 2013.

The observatory is in good stead; it is highly popular with the public (we had 3800 visitors this year!), has got a growing arsenal of unique telescopes, and enjoys devotion by a dedicated crew and also is financially viable. We thus look forward to an exciting 2013, with further development of the observatory, and two bright comets (PANSTARRS and ISON).

*Jacco van Loon*

## Administrative report

### Personnel

Keele Observatory is operated and maintained by a unique partnership between the Astrophysics Group in the School of Physical and Geographical Sciences at Keele University, and a group of skilled and enthusiastic volunteers: the Observatory Support Team a.k.a “The Observatory Crew”. At the start of 2012 the Crew comprised of James Albinson, Alan Bagnall, Dave Caisley, Edd Doody, Stephen Doody, Keith Heron, Paul Klimczak, Alan Mason, St.John Robinson, Matthew Stretch and John Webb, with an advisory role by former Director and founder of Keele Observatory, Ron Maddison. Joining us in 2012 was Nicholas Haselgrave – a radio astronomy amateur and Physics student – and we welcomed back Martin Plater.

Approval was finally obtained, and awards were made, of the status of “Associate of the University” for key non-University employees on the crew. This lengthy process will continue through 2013 due to several bureaucratic hurdles.

John Webb gave all a shock when he crashed his motorcycle, badly injuring his arm. He is recovering slowly but steadily.

Work experience student Arnaud Lacey spent a few days working with us.

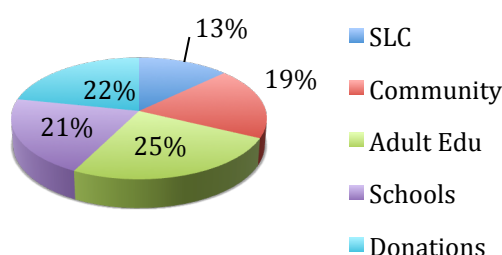
### Finances

The Keele Observatory building is part of the School of Physical and Geographical Sciences, and the directorate of Estates are called upon to service and maintain the infrastructure. In 2012 this included preventive measures against rain damage and an assortment of small repairs. The observatory’s equipment also needs regular attention, carrying expenses with it. Therefore we seek to generate a steady income, while offering our services to the public for free or for a small donation. Major developments need special funding.

Income was generated by visits of community groups, schools (one of which was organized via KeeleLink), Science Learning Centre workshops and Adult



Education sessions. Donations included sales of the History booklet and the closing of an obsolete account. This amounted to £1234, which is £34 above budget.



**Table 1 Financial account for 2012.**

1. Balance brought forward	£1661
<b>Income</b>	
Science Learning Centre	£160
KeeleLink + school activities	£255
Community group visits	£236
Adult Education	£314
Donations	£269
EPSAM (50 <sup>th</sup> anniversary)	£153
Central services	£13425
Friends of Keele	£13000
2. Total income	£27812
<b>Expenditure</b>	
General maintenance	£332
Printing Annual Report 2011	£50
Printing History booklet	£2572
50 <sup>th</sup> anniversary	£755
Solar telescope investment	£1847
Refurbishment	£6156
Viewing platform	£15600
3. Total expenditure	£27312
Surplus (items 1 + 2 - 3)	£2161

Also included in the account are one-off contributions for specific cases: remaining refurbishment money and some creative accounting liberated funds to realize expansion of the workshop, recladding of the binoculars' enclosure, pollarding of trees in front of the building, and investment in a large solar telescope (viz. its mount) and printing of the History booklet; the Friends of Keele generously

contributed towards a viewing platform. Unfortunately, applications to research council schemes to fund the solar telescope itself were unsuccessful.

The 50<sup>th</sup> anniversary event over-ran budget by £352 due to catering expenses. Maintenance costs stayed approximately within budget whilst the expected new acquisitions were absorbed within the afore-mentioned refurbishment funds.

Based on the accounts for 2011 and 2012 and budget for 2012, we set a budget for 2013. We foresee purchasing display cabinets, leaving little room for additional development. To enable the latter, we are seeking support from elsewhere within the University.

**Table 2 Budget for 2013.**

1. Balance brought forward	£2161
<b>Income</b>	
Hospitality	£900
Donations	£300
2. Total income	£1200
<b>Expenditure</b>	
General maintenance	£300
Acquisition of equipment	£800
Printing Annual Report 2012	£53
3. Total expenditure	£1153
Surplus (items 1 + 2 - 3)	£2208

## Infrastructure and equipment

*With contributions by St.John Robinson*

### Development of Observatory Hill

The Friends of Keele generously donated the funds to construct a viewing platform next to the binoculars' shed. A circular arrangement of benches surrounds the relocated pillar for the 8" Davies refractor. Tiles indicate the four cardinal directions. The concrete platform was inaugurated on 24 November (see Figure 1) by unveiling a commemorative plaque. It has proven to be quite popular with people enjoying lunch, a conversation or reading a book.



**Figure 1** The viewing platform with some Friends of Keele and the Davies refractor as the centerpiece.

With Dave Caisley's help the pillar was shot blasted, primed and on its return coats of aluminium paint were applied. The equatorial mounting of the Davies refractor was stripped and refurbished, Matthew Stretch doing some of the heavier turning work required.

Outside contractors re-clad the roll off with aluminium panels to match that of the main observatory building, and they cleaned and painted the supporting steel work. The observatory support team had to reposition one of the tracks, which was achieved by cutting the support brackets and welding in an extension piece. It might have been nudged by a dumper during the building of the viewing platform.

The track leading up to Observatory Hill has been named "Observatory Walk".

### The Keele Observatory workshop

Keele Estates and Buildings have formed a doorway between the existing workshop and a small room that had been set aside as a plant room for the Earth Sciences annex that was to be attached to the observatory (see Figure 2); the latter project has since been relocated to the Sustainability Hub.

The observatory support team built two substantial benches to support the ML4 lathe that is now ready for service. One of our more recent members built a steel frame to support the drill press and secure it to the floor. The workshop was tidied up, with a lot of stuff going to Ethical Recycling in Tunstall. Well equipped, the workshop welcomes new hands on deck.



**Figure 2** The new annex to the workshop, with the door opening out to the North side of the building.

### Engineering work on the Thornton

During 2012 we had anticipated the finalization and installation of the new pointing and tracking system upgrades. This did not happen due to AWR's other commitments. However, they are now in receipt of up-to-date requirements, and it is expected that a design review will take place in the near future.

Another setback was the company e2v pulling out of their offer to supply us with a new generation 4kx4k CCD which would yield a degree field of view. They had received a "super contract", and also insisted on cryogenic cooling. After some deliberation it was decided that our new QSI camera will replace the ST7. The QSI has a larger field-of-view and smaller pixel – it can be used with 2x2 binning.

On a more positive note the new 24" primary mirror was re-aluminised and re-



**Figure 3** St. John Robinson at the focuser platform of the 24" Thornton reflector.





Figure 4 The 12" Grubb (Oxford) refractor, carrying the 17" Hindle reflector. Photo credit: Allan Sharman.

coated by Orion Optics. Whilst engineering work continues the old primary mirror will remain in place to retain balance.

Recently applied powder coating on the 24" primary cell was not successful. The cell was removed and stripped of its 18-point floatation system. Some remedial work was carried out on the floatation support pad pivot points and collimation adjustment screws, one of which had become quite stiff in operation. In the meantime, Dave Caisley arranged for the bare cell to be taken away for shot blasting and coating with black epoxy resin. The cell on its return had its threads cleaned out, the floatation system reinstalled, and it was subsequently re-attached to the 24".

The primary mirror cover is being reworked again; Steve Doody is leading the new design and implementation.

In preparation for the upgrade, the Declination encoder 28-tooth pulley wheel was replaced with a 10-tooth pulley wheel; this should provide a marked improvement in pointing resolution. The machining was carried out in the observatory workshop.

All of the data and control cables that over the years had been threaded through the Declination axis have been removed in preparation for the upgrades. A number of connections to micro switches et cetera will require remaking as they have frayed in service. The data and control cable loom will be rerouted.

Exceptional rainfall caused some water damage in the control room (walls). Estates have re-landscaped the grounds adjacent to the back of the observatory to prevent similar incidences from happening.

#### **Maintenance of the Grubb and its dome**

Very little work was carried out on the 12" Oxford refractor this year; however we have prepared for the electricians to install two heater elements about 12" behind the objective cell. This arrangement should provide sufficient heat, bleeding into the tube to raise the temperature to prevent dew forming on the objective, without compromising optical quality.

Corrosion of the telescope and the condition of the aging primary objective



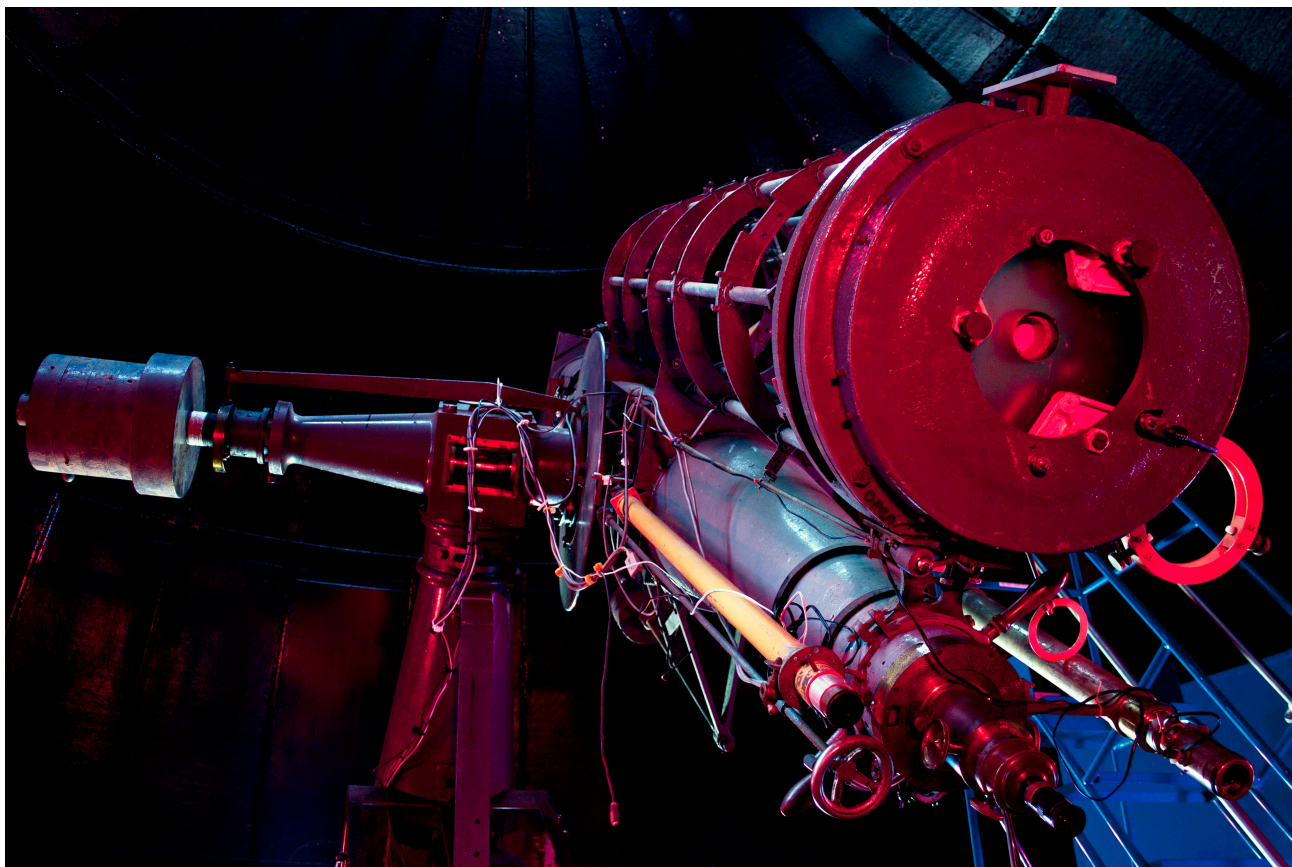


Figure 5 The 12" Grubb (Oxford) refractor, carrying the 17" Hindle reflector. Photo credit: Sean Carnall.

(see Figure 6) is giving us some reason for concern. A major restoration will need to be planned within the coming few years.

As an experiment, the 5" Watson Century refractor was mounted on the 12" Grubb refractor for a while acting as a large finder. This was not particularly successful, the weight of the instrument (along with the 17" Hindle reflector) is too much for the balance of the 12", so it was removed.

Two 1.25" eyepiece barrels were

fabricated for an old microscope binocular head. All that is required is the purchase of two 1.25" 26-mm eyepieces. Fitted to the 12" Grubb refractor this should provide pleasing "stereoscopic" view of the Moon.

### The Solar Telescope Project

As an investment into a project to acquire a 6" H $\alpha$  refractor we purchased a Celestron GEM/DX equatorial mount thus depleting the remainder of the observatory's



Figure 6 The 12" Grubb (Oxford) refractor objective seen from different angles. Photos credit: Jacco van Loon.



**Figure 7** The Celestron GEM/DX mount carrying the 5" Watson, and Keele student-to-be Thomas Challinor.

refurbishment funds. Unfortunately, appeals to the Science and Technologies Facilities Council to fund the telescope itself were unsuccessful. Meanwhile it was decided to place the 5" Watson refractor on this mounting (Fig. 7) by adding to the dove-tail mounting plate a thick and longer high density plastic plate, to which the Watson's support rings were attached.

### Crime and in-kind donations

This year saw both a large number of generous gifts by public and observatory regulars, as well as more instances of criminal behaviour than has been usual.

A break-in into the binoculars' shed luckily did not lead to any items missing, but a 9-mm eyepiece went astray during Stargazing Live. A teenager left a work of art on the dusty 24" mirror (the old one, fortunately), there was some climbing onto the newly-clad shed, and the removal (but not from site) of parts from the equatorial mount on the new viewing platform.

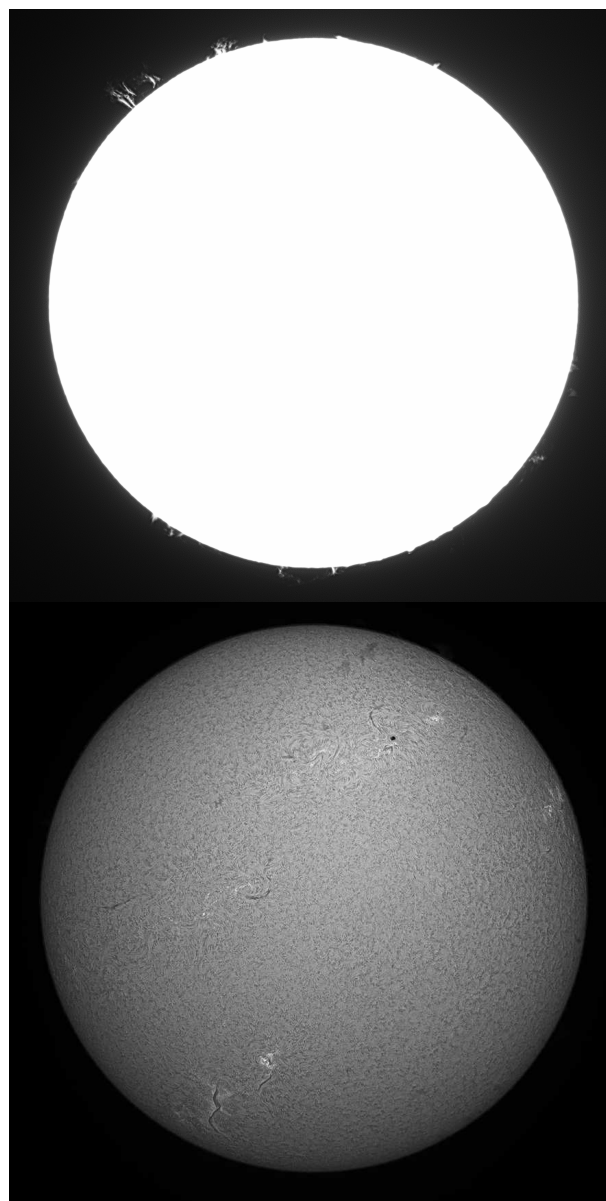
The late Mr. Lyndon Steele (MSc in Computer Science at Keele University) left us a 4.5" f/8 Newtonian in a good state. Two 9-mm eyepieces were donated by Martin Plater, Dave Caisley supplied some micrometres, Paul Blurton gave us metal work, Pete fabricated a replacement drill press table and took away much junk, an

anonymous donor left a poster of a solar flare and a book about the Hubble Space Telescope, Nye Evans sends us his *Sky at Night* magazines with accompanying CDs, and we got a Moon globe on permanent loan from Science Education (John Perry).

## Research activities

### Solar observations

The Sun continued to be imaged on various occasions by Stephen Doody, with help of a Lumenera camera, through the Coronado 4cm solar telescope (Fig. 8).



**Figure 8** The Sun's bright prominences imaged on the 14<sup>th</sup> of January (top), and surface features on the 1<sup>st</sup> of April (bottom). Photos credit: Stephen Doody.



## Publications

In 2012 we published

“Keele Observatory Annual Report 2011”,  
J.Th. van Loon (ed.). KOP 3

(an edition of 50 copies) and printed 2080 copies of Ron Maddison’s “The First fifty Years of the Keele University Observatory” (KOP 2), a.k.a. “the History booklet”.

The Observatory Director has commenced an inventory of the old prints and atlases that are kept in a massive map cabinet. This will be an on-going project with the aim to restore and display some of the more interesting and valuable material.

## Outreach activities

### BBC2’s “Stargazing Live”

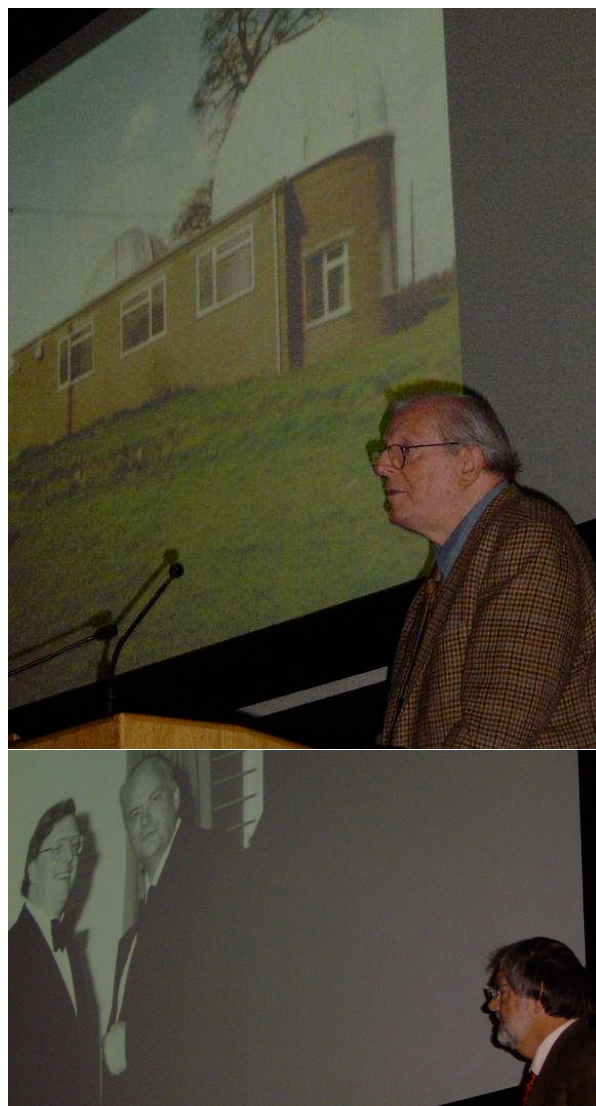
Keele Observatory took part in the second edition of BBC2’s “Stargazing Live”, on the 16<sup>th</sup> to 19<sup>th</sup> of January. About 1000 people visited us! This was quite a challenge, as the skies were fairly clear and the queue for a view through the 12” refractor started outside in the freezing cold. Our volunteers were identifiable by their name badges; we had ordered hi-vis vests but unfortunately they only arrived after the events.

The Keele events were covered by The Sentinel newspaper, BBC Radio Stoke and Radio CrossRhythms. The observatory enjoyed busy times and frequent enquiries by phone and e-mail for some time after.

A Big Thank You to the Crew, staff and students, as well as Chris Stone at the Keele University press office.

### Keele Observatory’s Birthday Party

To celebrate the 50<sup>th</sup> anniversary of the founding of Keele Observatory, a public event was organized on the 19<sup>th</sup> of May. Among the 210 visitors were many “old friends” of the observatory – the previous directors Prof. Tim Naylor and Prof. Nye Evans, Prof. Michael Bode, and of course Dr. Ron Maddison! The Dean of the Faculty of Natural Sciences and the Head of School of Physical and Geographical Sciences were

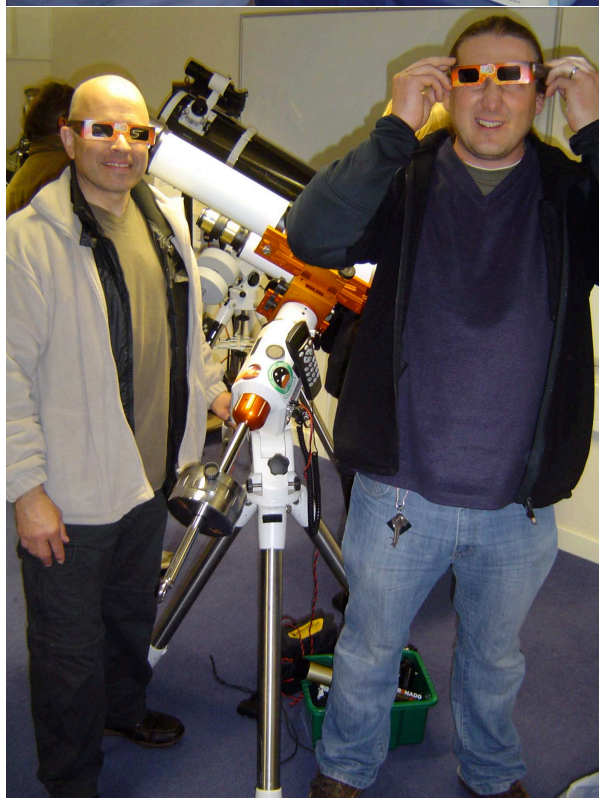


**Figure 9** Dr. Ron Maddison (top) in top shape, and Prof. William Leatherbarrow (bottom) in awe of Ron and Sir Patrick Moore. Photos credit: Jacco van Loon.

present. Dr. Ken Elliott demonstrated his CCDSpec, Phill Parker brought his Apollo collection, Andromeda Observatories had a stand, and some people brought telescopes. Mark Townley handed out Sun goggles – unfortunately the Sun itself refused to cooperate for the “Sun and Star Party”.

Dr. Ron Maddison opened the day reliving vivid memories. He was followed by Claus Madsen of the European Southern Observatory (which also celebrated their 50<sup>th</sup> anniversary this year!), the president of the British Astronomical Association Prof. William Leatherbarrow, with Kevin Kilburn identifying archaeo-astronomical alignments in the Moorlands and Dr. Allan Chapman speaking about historic Venus transits of the 19<sup>th</sup> (and 18<sup>th</sup>) century.





**Figure 10** Top: Phill Parker (top) and his collection of Apollo curiosities; Middle: Mark Townley (at right) and his pal Steve; Bottom: Ken Elliott demonstrating his CCDSpec to Mark. Photos credit: Jacco van Loon.

The event featured in The Sentinel, and Ron was interviewed on BBC Radio Stoke.

### The last Venus Transit of our generation

In the early hours of the 6<sup>th</sup> of June, the rising Sun was being transited by Venus, the last such display for another century. About twenty people gathered at Keele Observatory to witness the event shortly after 5 a.m. While the weather did not oblige and nothing was seen of the transit it was a nice day nonetheless.



**Figure 11** We were all looking in the direction of the Venus Transit... and a thick band of cloud in the East. Photos credit: Jacco van Loon.

### Public viewings

Some 1150 people visited the Observatory this year for its Tuesday evening and Saturday afternoon free public viewings. We encountered a couple of *very* busy evenings in March, some of which were prompted by 6 o'clock news stories.

A number of telescope surgeries were conducted where the owners were not satisfied with the performance of their instruments; but we were able to improve the performance of their instruments. In addition, much advice and guidance was provided to prospective telescope buyers.

Keele Observatory's director was asked to comment on Mars rover Curiosity, on BBC Radio Stoke and Talk Radio Europe.





**Figure 12** The observatory support team explaining to the public. From top to bottom are: Jacco van Loon, John Webb, St.John Robinson, and James Albinson. Photos credit: Allan Sharman.

### Schools and teachers

The Science Learning Centre organized an End of the World conference, a Physics Summer School and a Newly Qualified Teachers workshop, while KeeleLink organized a school visit. Five more school visits were arranged directly with the Observatory. These events reached over

300 learners, some 60 teachers and close to 40 parents.

Open Days for prospective students, and a morning trip to the observatory for our freshers reached another 300 people.

### Community group visits

Apart from the aforementioned events and regular open sessions we welcomed a large number of societies, clubs (especially cubs and brownies) and various other parties. Community Day drew 180 visitors to the observatory, and approximately 340 people visited us on other occasions.

### Adult Education sessions

*By Prof. Rob Jeffries*

Once again the observatory played host to the "Keele Astrophysics Discussion Group" where we swapped our views on the latest discoveries in astronomy and astrophysics. This year there were 10 (roughly monthly) meetings, attended by an average of 20 visitors. The meetings in the early part of the year were devoted to learning about Relativity in both its "Special" and "General" flavours and how experiments, particularly in astronomy, are able to test these ideas. We looked at the bending of light, gravitational lenses, binary pulsars and gravitational waves. In the second half of the year we turned our attention to particle physics, learning about the vast range of scales in the universe, elementary particles, fundamental forces and what the Large Hadron Collider is for.

These meetings are free (donations to the upkeep of the observatory and its activities are welcomed) and open to the public. You can find out meeting dates and times and what we are likely to be talking about by looking at our Facebook page (KeeleAstrophysicsDiscussionGroup).



